

Claims

We claim:

1. A network for communicating a message, the network comprising topographic network devices and communication links interconnecting the topographic network devices, the topographic network devices each having a physical location represented by a topographic coordinate set and having a network address that includes the topographic coordinate set.

2. The network of claim 1, additionally comprising a global positioning system receiver at least temporarily connected to ones of the topographic network devices to supply the topographic coordinate set thereto.

3. The network of claim 1, in which each of the topographic network devices is connected to at least one other of the topographic network devices and includes means for transmitting its topographic coordinate set to the at least one other of the topographic network devices.

4. The network of claim 1, in which each of the topographic network devices is connected to at least one other of the topographic network devices and includes means for receiving a topographic coordinate set from each of the at least one other of the topographic network devices.

5. The network of claim 1, in which ones of the topographic network devices capable of originating the message for transmittal through the network to another of the topographic network devices as a destination network device each include a topographic addressing engine that operates to include the topographic coordinate set of the destination network device in the message.

6. The network of claim 1, in which:

the message includes the topographic coordinate set of a destination network device as a destination coordinate set, the destination network device being one of the topographic network devices; and

5 a one of the topographic network devices as an intermediate network device, upon receiving the message, operates to route the message to another of the topographic network devices, the other of the network devices being physically closer to the destination network device than the intermediate topographic network device.

7. The network of claim 1, in which the network addresses of ones of the topographic network devices having substantially coincident physical locations each include an additional numeric data field.

8. The network of claim 1, additionally comprising additional network devices and additional communication links, the additional communication links connecting the additional network devices to ones of the topographic network devices, the additional network devices having conventional network addresses lacking topographic coordinate sets.

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9. The network of claim 8, in which:

ones of the additional network devices each operate to generate the message addressed to a destination network device identified by a destination network address, the destination network address lacking a topographic coordinate set; and

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ones of the topographic network devices each include a topographic translator that operates in response to the destination network address of the message to provide the topographic coordinate set of another of the topographic network devices as a destination coordinate set for the message, the other of the routers being associated with the destination network device.

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10. The network of claim 9, in which the other of the topographic network devices is associated with the destination network device by being directly connected thereto.

11. The network of claim 9, in which:
the destination network address includes a domain name; and
the other of the topographic network devices is associated with the destination network device by being associated with the domain name
5 included in the destination network address.

12. The network of claim 11, in which the other of the topographic network devices operates to receive the message and to provide a new destination coordinate set for the message, the new destination coordinate set being the topographic coordinate set of an output one of the topographic network devices to which the destination network device is directly connected.
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13. The network of claim 1, in which:

the message includes a destination coordinate set, the destination coordinate set being the topographic coordinate set of a destination network device, the destination network device being one of the topographic network devices;

the network includes regions, each of the regions comprising at least one regional network device, the regional network device being one of the topographic network devices, the regional network devices of the regions being interconnected by high-capacity communication links, the high-capacity communication links being high-capacity ones of the communication links;

the topographic network devices in each one of the regions each include additional topographic information indicating the topographic coordinate set of the regional network device of the one of the regions and a topographic extent of at least some of the regions; and

a one of the topographic network devices, upon receiving the message, operates in response to the destination coordinate set and the additional topographic information to route the message to the regional network device when the additional topographic information indicates that the destination network device is located in another of the regions.

14. The network of claim 13, in which the regional network device operates in response to the destination coordinate set and the additional topographic information stored therein to route the message to the regional network device of the region in which the destination network device is located.

15. A topographic network device for operation in a network including topographic devices in which each of the topographic network devices has a physical location represented by a topographic coordinate set, in which each of the topographic network devices additionally has a network address that includes the topographic coordinate set, and in which a message configured for transmission through the network includes a destination coordinate set, the destination network set being the topographic coordinate set of a destination network device, the destination network device being one of the topographic network devices, the topographic network device comprising:

channels each configured for connection via a communication link to another of the topographic network devices, the channels including a first channel via which the message is received;

a coordinate store for storing connected device coordinate sets, the connected device coordinate sets being the topographic coordinate sets of the topographic network devices to which the channels are directly connected; and

a topographic processor that operates in response to the connected device coordinate sets stored in the coordinate store and the destination coordinate set of the message to identify a second channel to which to forward the message, the second channel being another of the channels.

16. The topographic network device of claim 15, in which the second channel is the one of the channels connected to another of the topographic network devices that is physically closer to the destination network device than the network device.

17. The topographic network device of claim 15, in which the coordinate store is configured to store, as connected device coordinate sets, topographic coordinate sets received from ones of the topographic network devices directly connected to the channels of the network device.

18. The topographic network device of claim 15, in which:

the coordinate store is additionally configured to store at least one of (a) device-type information and (b) additional topographic information for the ones of the topographic network devices directly connected to the network device; and

the topographic processor additionally operates in response to at least one of the device-type information and the additional topographic information to identify the second channel.

19. The topographic network device of claim 15, in which:

the coordinate store is additionally configured to store additional topographic information relating to the network; and

the topographic processor operates in response to the additional topographic information in lieu of the destination coordinate set of the message to identify the second channel.

20. The topographic network device of claim 19, in which the topographic processor operates in response to the additional topographic information to identify, as the second channel, a one of the channels connected at least indirectly to one of the communication links at least one of (a) having a higher transmission capacity, and (b) carrying less pre-existing network traffic.

21. The topographic network device of claim 19, in which:

the network includes regions, each of the regions comprising at least one regional network device, the regional network device being one of the topographic network devices, the regional network devices of the regions being interconnected by high-capacity communication links, the high-capacity communication links being high-capacity ones of the communication links; and

the topographic processor operates in response to the additional topographic information to identify, as the second channel, a one of the channels connected to the regional network device of the region in which the topographic network device is located.

22. The topographic network device of claim 15, in which:

the network additionally comprises additional network devices and additional communication links, the additional communication links connecting the additional network devices to ones of the topographic network devices, the additional network devices having conventional network addresses lacking topographic coordinate sets, the additional network devices including a destination network device;

the message includes, instead of the destination coordinate set, a destination network address identifying the destination network device, the destination network address lacking a topographic coordinate set;

the topographic network device additionally comprises a topographic translator that operates on receipt of the message and in response to the destination network address to provide the topographic coordinate set of another of the topographic network devices as the destination coordinate set for the message, and

the topographic processor operates in response to the destination coordinate set provided by the topographic translator.

23. The topographic network device of claim 22, additionally comprising a packet processing engine that operates to inhibit operation of the topographic translator when it detects a destination coordinate set extant in the received message.

24. The topographic network device of claim 22, additionally comprising:
a packet processing engine that operates to detect a destination coordinate set in the message and, when it detects the destination coordinate set, to determine whether the destination coordinate set is equal to the topographic coordinate set of the topographic network device; and

a conventional address processor that, when the packet processing engine determines that the destination coordinate set is equal to the topographic coordinate set of the topographic network device, operates in response to the destination network address to identify the second channel.

25. The topographic network device of claim 22, additionally comprising a packet processing engine that operates to insert the topographic coordinate set of the topographic network device into the message as a reply-to coordinate set.

26. A computer-readable medium in which is fixed a computer program that instructs a computer to perform a topographic network message addressing method, the addressing method comprising:

receiving an original message;

determining whether a valid topographic reply-to field exists in the original message, the valid topographical reply-to field including a topographic coordinate set; and

when the valid topographic reply-to field exists in the original message:

in response to the original message, creating a reply message to include a destination coordinate set field, and

copying the topographic coordinate set from the topographic reply-to field of the original message to the destination coordinate set field of the reply message.

27. The computer-readable medium of claim 26, in which:

the original message additionally comprises a reply-to address, the reply-to address lacking a topographic coordinate set; and

the addressing method additionally comprises storing the topographic coordinate set linked to the reply-to address.

28. The computer-readable medium of claim 26, in which:

the original message additionally comprises a reply-to address, the reply-to address lacking a topographic coordinate set;

in creating the reply message, the reply message is created additionally to include a destination network address field; and

the addressing method additionally comprises copying the reply-to address from the original message to the destination network address field of the reply message.